

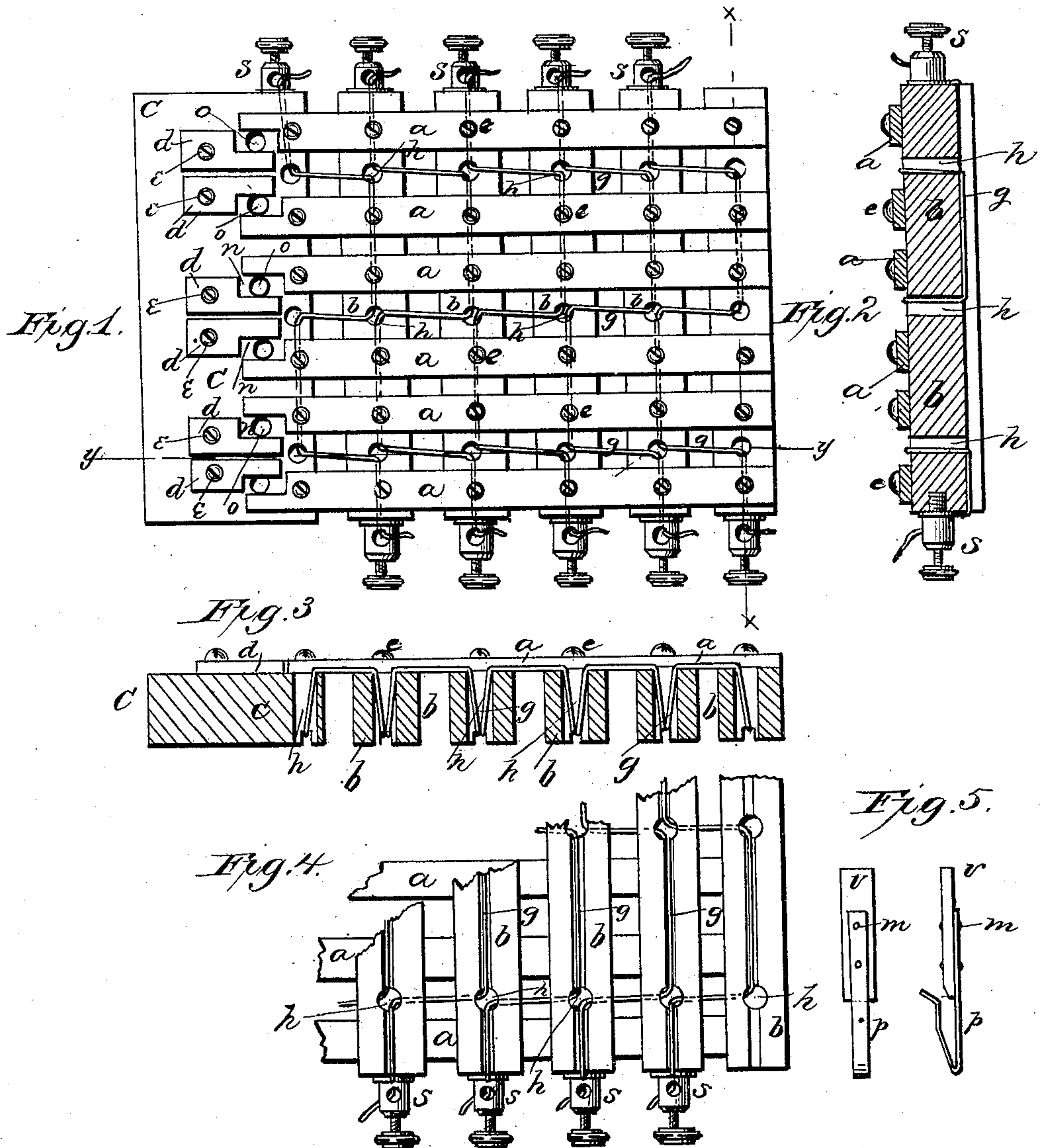
(No Model.)

J. S. ROSS.

ELECTRIC SWITCH BOARD.

No. 246,343.

Patented Aug. 30, 1881.



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# UNITED STATES PATENT OFFICE.

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## ELECTRIC SWITCH-BOARD.

SPECIFICATION forming part of Letters Patent No. 246,343, dated August 30, 1881.

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*To all whom it may concern:*

Be it known that I, JAS. S. ROSS, of Nashville, county of Davidson, State of Tennessee, have invented an Improvement in Electric Switch-Boards, of which the following description, in connection with the accompanying drawings, is a specification.

My invention relates to electric switch-boards, and has for its object a cheap and simply-constructed switch, which may be easily and readily operated to make sure connections without danger of deranging the parts by the forcible use of unyielding connecting plugs or wedges.

The invention is shown embodied in a central-office switch-board of a telephonic exchangesystem; but it is obvious that it is equally applicable to any electric switch-board—as, for instance, those used for telegraphic purposes. In any case the object of a switch-board is to enable any one of a series of circuits to be connected with any other of the said series, or with a ground-wire or battery or instrument, as desired. This is accomplished by having a series of independent electric conductors crossing but insulated from another series, so that each conductor of either series crosses all those of the other series, and may consequently be connected with any desired one of the other series by interposing a suitable piece of conducting material or connector between them.

It is obvious that if circuit-wires are connected with each series any circuit-wire of one series may be directly connected with one of the other series, or, as in the arrangement common in telephone systems, two of one series to which the lines-wires are connected are each connected with the same one of the other series, which thus acts merely as a medium for connecting any two of the same series, and consequently any two of the telephonic circuits centering in the said office and switch-board.

As usually arranged for telephonic exchanges, one series of conductors is vertical and the other horizontal, and the vertical ones are connected with the different telephonic circuits, while the horizontal ones are used to form the connection between any two vertical ones and circuits.

Figure 1, showing the face of a switch-board

embodying my invention, is a front elevation. As usually placed in a vertical plane, the lower side of the board is shown to the left at *c*, while the line-wires come to the top of the board shown at the right. Fig. 2 is a vertical section of Fig. 1 on line *x x*. Fig. 3 is a horizontal section on line *y y*. Fig. 4 is a rear view, showing a portion of the back of the board. Fig. 5 is a front and side view of a connecting-plug.

My invention consists of a series of metal strips or electrical conductors, *a*, fastened at intervals by screws or their equivalents *e* on one side of and at right angles to a series of wooden or other non-conducting bars, *b*, in such a manner as to secure the proper intervals between each of the strips *a* in one series and the bars *b* in the other, and to form a sufficiently rigid structure for the required purpose. The conducting-strips *a* are arranged in pairs, separated by the proper interval, and the strips in each pair by such an interval as will separate the inside edge of each strip from the edge of a wire or other electrical conductor, *g*, which is carried for a short distance parallel to the edge of the strips *a*, and in the same plane with said strips, thence each way through holes *h* in the bars *b*, and along the under side of the bars *b* either way to the next hole *h*, and up through hole *h*, crossing back in the opposite direction to and downward through the hole *h* in the next bar *b*, each wire or conductor *g* beginning at a binding-screw, *s*, in the end of a bar, *b*, and passing along the under side of the bar to the first hole *h*, up through *h*, and across to the first hole *h* in the next bar *b*, thence through *h*, and along the under side of this bar to the second hole *h*, up through *h*, and back across to the first bar *b*, and so forth, each conductor *g* passing backward and forward across from the one to the other on the front side of a pair of bars, and from one hole *h* to the next hole *h*, along the rear side of first one, then the other, of the said pair of bars *b*. Each hole *h* is made large enough to accommodate, without danger of contact with each other, two of the conductors *g*, which pass in opposite directions from the said hole *h* along the under side of the bar *b* to the next hole *h*, and similarly across the front side of the bar to the next bar



on each side. In this way each conductor *g* is made to cross the space between a pair of bars *b* backward and forward at regular distances and midway between each pair of conducting-strips *a*, without normally making electrical contact with any of the strips *a* or with any of the other conductors *g*.

The spaces between the bars *b* are made slightly wider than the spring *p*, Fig. 5, which is a part of the plug for connecting the vertical strips to the horizontal conductors. The spaces between the edges of the strips *a* and the parallel portions of the conductors *g* are uniform, and less than the normal distances of the free end of spring *p* from the opposite points on the spring *p*, so that when the spring-plug, Fig. 5, is pushed into the space between a strip, *a*, and a conductor, *g*, the sides of the spring *p* rub against and make electrical connection with and between the said strip *a* and conductor *g*, but pass freely into the space between the bars *b*.

The spring *p* is shaped so that when in its proper position between a vertical strip, *a*, and a horizontal conductor, *g*, the contact-points on the opposite limbs of the spring *p* are nearer together than are the adjacent points in each limb, so that the spring-plug tends to retain its proper position effecting contact, and is not liable to be jarred out of its position, but may readily be withdrawn, as there is no tendency to stick from having been wedged into position.

Should the spring-plugs all be placed in line in one of the spaces described between the bars *b*, they would occur in pairs, each too close to its mate for convenience in withdrawing them separately. In order to overcome this difficulty and to provide an independent contact or terminal connection by which each vertical strip may be connected to a common ground through a battery or otherwise, or to any desirable apparatus by means of its spring-plug, I cut away a portion of each strip *a* equal to half its width and provide separate conducting plates *d* at the end of each strip *a*, fastened to a bar, *c*, of sufficient width, a portion of each plate *d* being cut away in a similar manner as the ends of the strips *a*, each plate being placed in such a position with reference to one of the strips that the parallel edge of the cut portion of the plate *d* is the same distance from the opposite parallel edge of the cut portion of the strip *a* as the spaces between the strips *a* and the conductors *g*. By this means, when the spring-plug *p* is inserted between the opposite cut edges of the strips *a* and plates *d*, electrical contact is effected for the purposes set forth.

Holes *o* must be made in the bar *c* large enough to readily admit the spring-plugs between the strips *a* and plates *d*, and the strips *a* and plates *d* are fixed in such relative positions as that the spring-plugs, when in their normal positions between the strips *a* and plates *d*, will be equidistant from each other.

The section cut from the end of the strip *a* may be just the complement of the section cut

from the plate *d* to make the full width of the strip, so that the plate may be struck from the strip material, leaving the sections ready cut with no waste.

The spring-plugs may be simply constructed by riveting one end of a spring of a metallic conductor to the end of a suitable piece of vulcanite, or other non-conductor, and bending or shaping the spring into a V-shaped wedge, the limbs of which normally remain farther apart than the distance between the strips *a* and the parallel portions of the conductors *g*, but which may be pressed close together, the spring-plug thus accommodating itself to a considerable range of distances between the strips *a* and conductors *g*.

A lip may be bent outward from the free end of the spring *p*, which also, with the shoulder of the non-conducting handle, will serve to stop the plug from being pushed beyond its proper position for making connection.

It is obvious that any of the conducting-strips *a* may be electrically connected with any of the conductors *g* by inserting a spring-plug between the two at the point where they are nearest to each other, and parallel and in the plane of the face of the board. In like manner may any two or more of the vertical strips or the line-wires which may connect with them be connected together by each being connected with one of the conductors *g*. Normally each line coming to the switch would be connected, through its strip *a*, spring-plug, and plate *d*, to a ground-battery or other connection; but upon removing the spring-plug from between the connecting-strip *a* and the plate *d* the line connected to said strip is left without any connection through plate *d* and free for any other connection through any of the conductors *g*.

The binding-screws *s* in the ends of the bars *b* are provided for connecting the conductors *g* in the switch-board to the corresponding conductors in any other switch-board, or to any other apparatus to be worked in connection with the board from either side.

It will be seen that, this form of board being constructed entirely of narrow pieces, the difficulty of accurately boring and otherwise preparing broad surfaces is entirely avoided, and that warping is impossible. The pieces requiring only equally-distanced holes, the latter may be bored by gage, thus securing accuracy and simplicity of construction, while the materials are inexpensive and of such simple form as to cost little for their preparation.

I claim—

1. An electric switch-board composed of a system of rigid insulated conducting-strips fastened with screws across a system of rigid non-conducting bars, the strips and bars mutually holding each other in their proper relative positions without the aid of other cross-bars or mounting for this purpose, and forming a comparatively rigid structure, the non-conducting bars carrying a second system of insulated conductors, each of which crosses



each of the first system of insulated conductors at a uniform minimum distance, so that by inserting a suitable connecting - plug at the proper point between them any conductor of  
5 the first system may be electrically connected to any conductor of the second system, substantially as described.

2. In an electric switch-board, the combination of conducting-strips fixed across non-conducting bars which support flexible conductors, so that the flexible conductors pass across the conducting-strips out of the plane of the strips, then across the non - conducting bars into the plane of the strips, but at a distance  
10 from the edges of the strips, then across spaces between the non-conducting bars and parallel to the conducting-strips, then across the non-conducting bars, out of the plane of the strips,

and along the non-conducting bars across the conducting-strips, and so on till each flexible  
20 conductor has passed for a short distance near the edge of each conducting-strip, so that any of the flexible conductors may be electrically connected to any of the conducting-strips by inserting a suitable connecting-plug between  
25 the edge of the strip and the parallel portion of the flexible conductor, substantially as described.

3. In an electric switch-board, the combination of the strips *a*, bars *b*, plates *d*, screws *e*,  
30 wires *g*, bars *c*, and plug *v m*, substantially as and for the purpose set forth.

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